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(54) **METHOD AND APPARATUS FOR MONITORING VIEWING OF BROADCAST DATA**

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(52) **U.S. Cl.** ..... **348/1**; 348/10; 348/7; 348/12; 455/6.1; 455/6.2; 455/5.1; 455/4.2

(58) **Field of Search** ..... 348/1, 4, 5, 10, 348/907, 7, 12, 13; 455/2, 6.2, 6.3, 5.1, 6.1, 4.2

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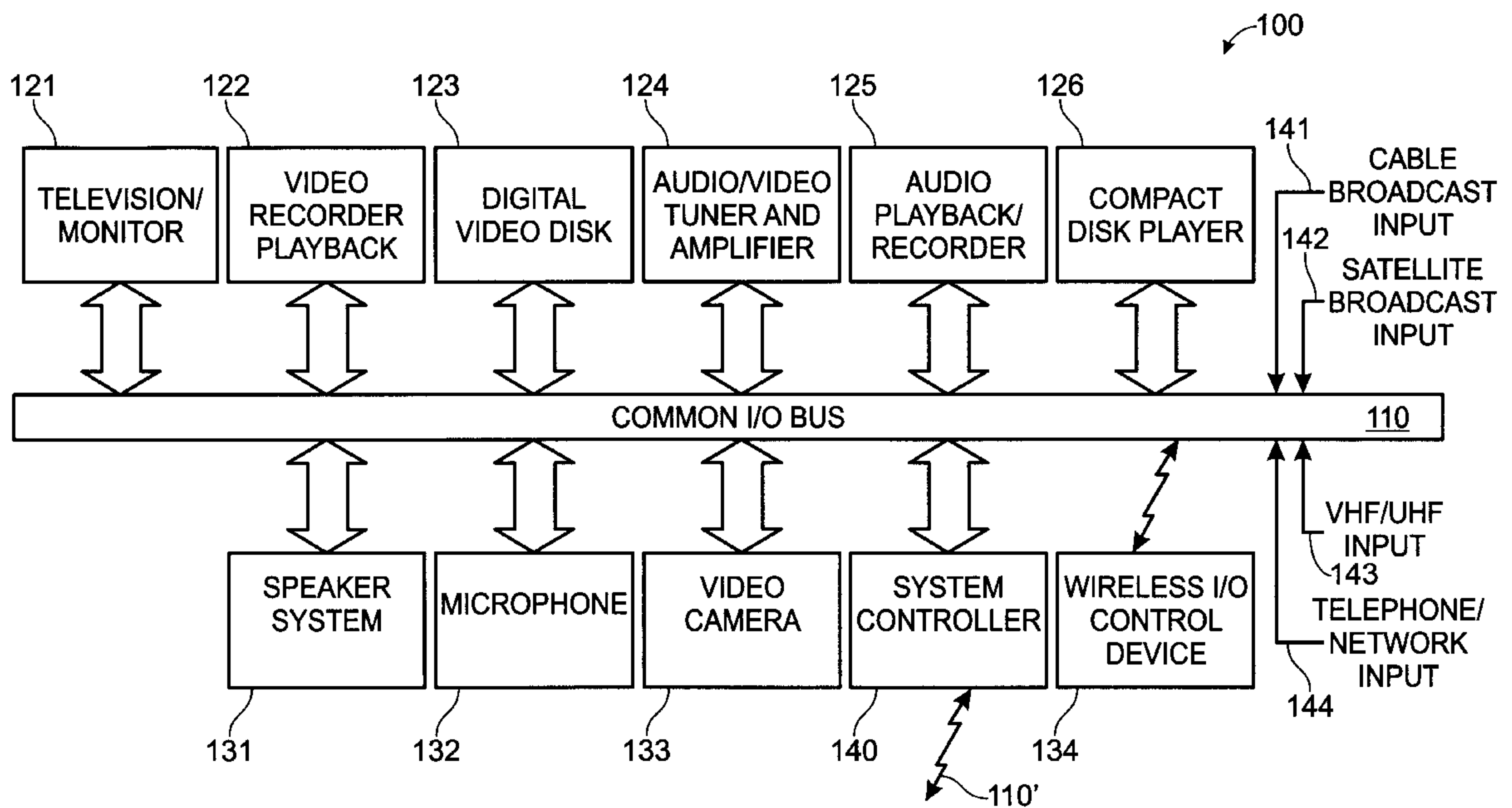
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(57) **ABSTRACT**

A method for monitoring viewing of broadcast data includes detecting a lead tag corresponding to a program in the broadcast data. The broadcast data is monitored for a tail tag corresponding to the program. Whether the program was viewed in its entirety is determined by matching the lead tag with the tail tag.

**18 Claims, 3 Drawing Sheets**



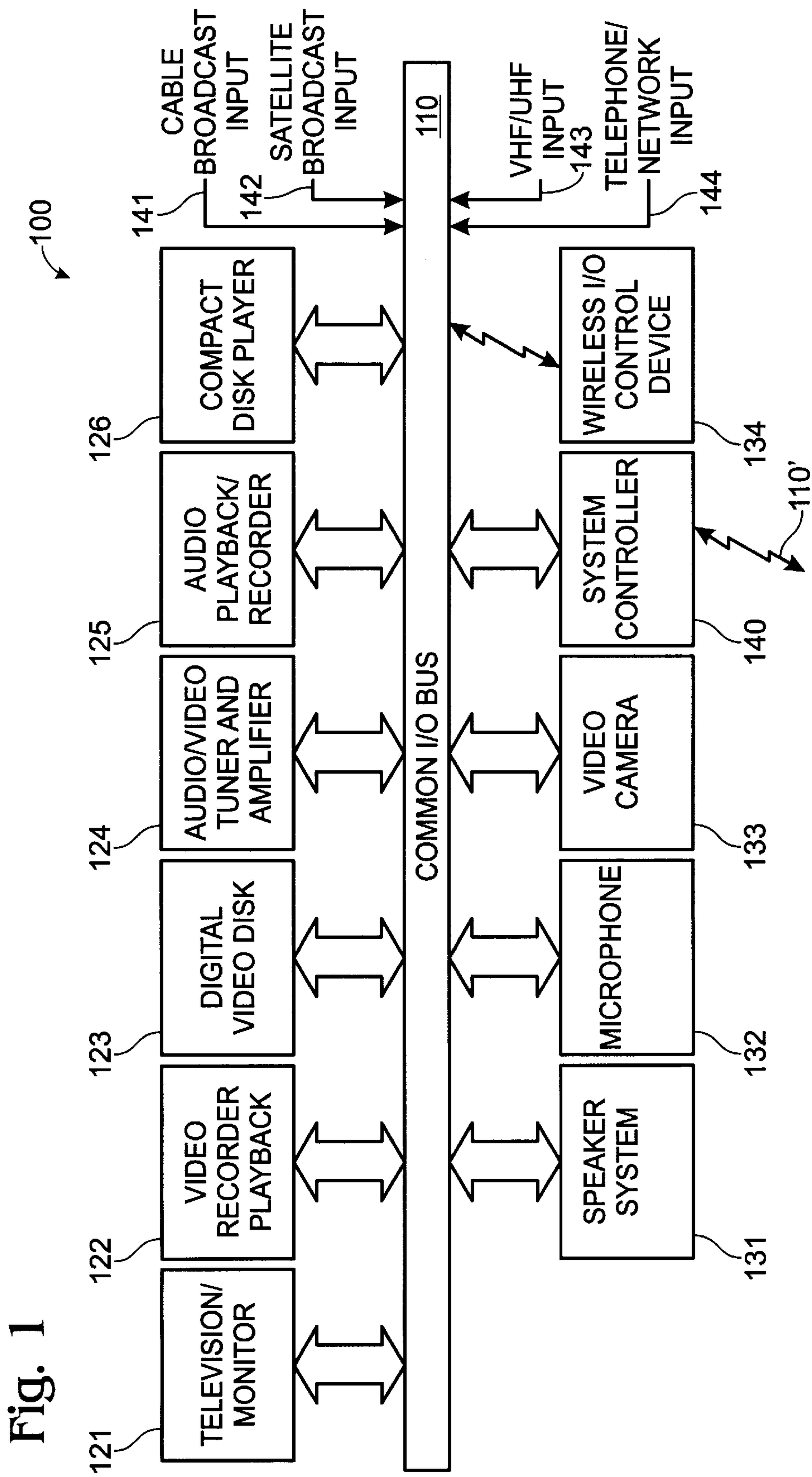


Fig. 2

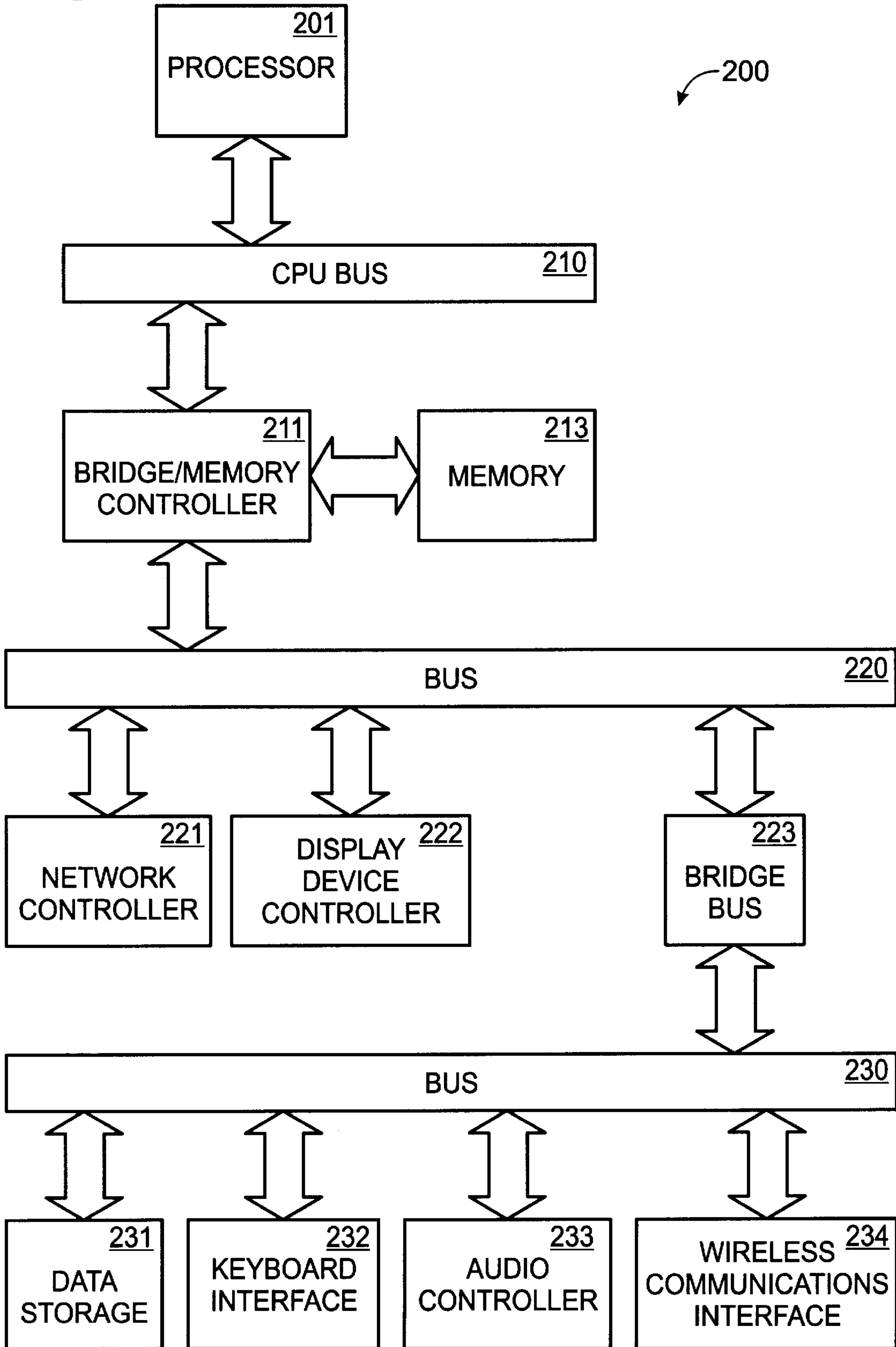


Fig. 3

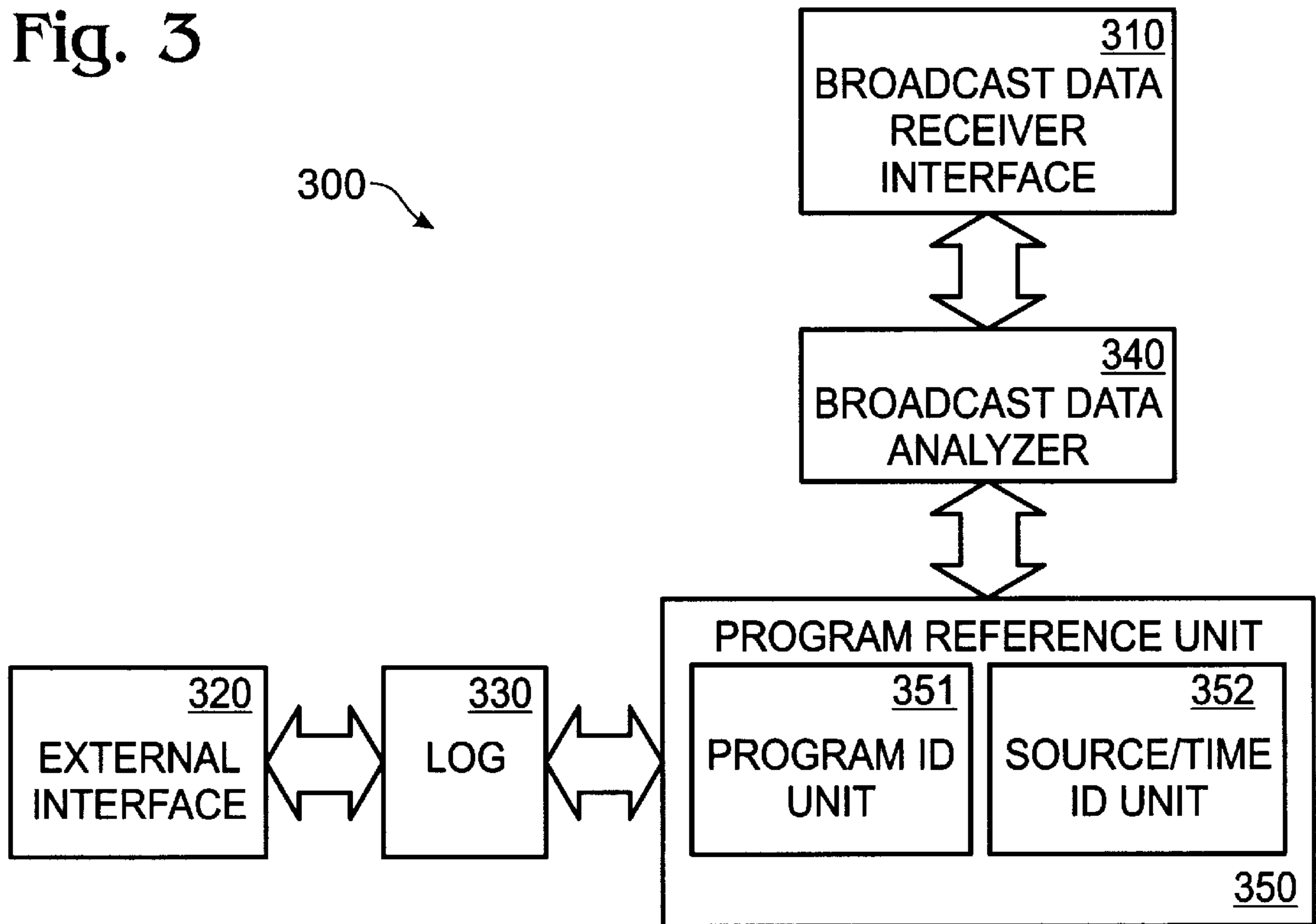
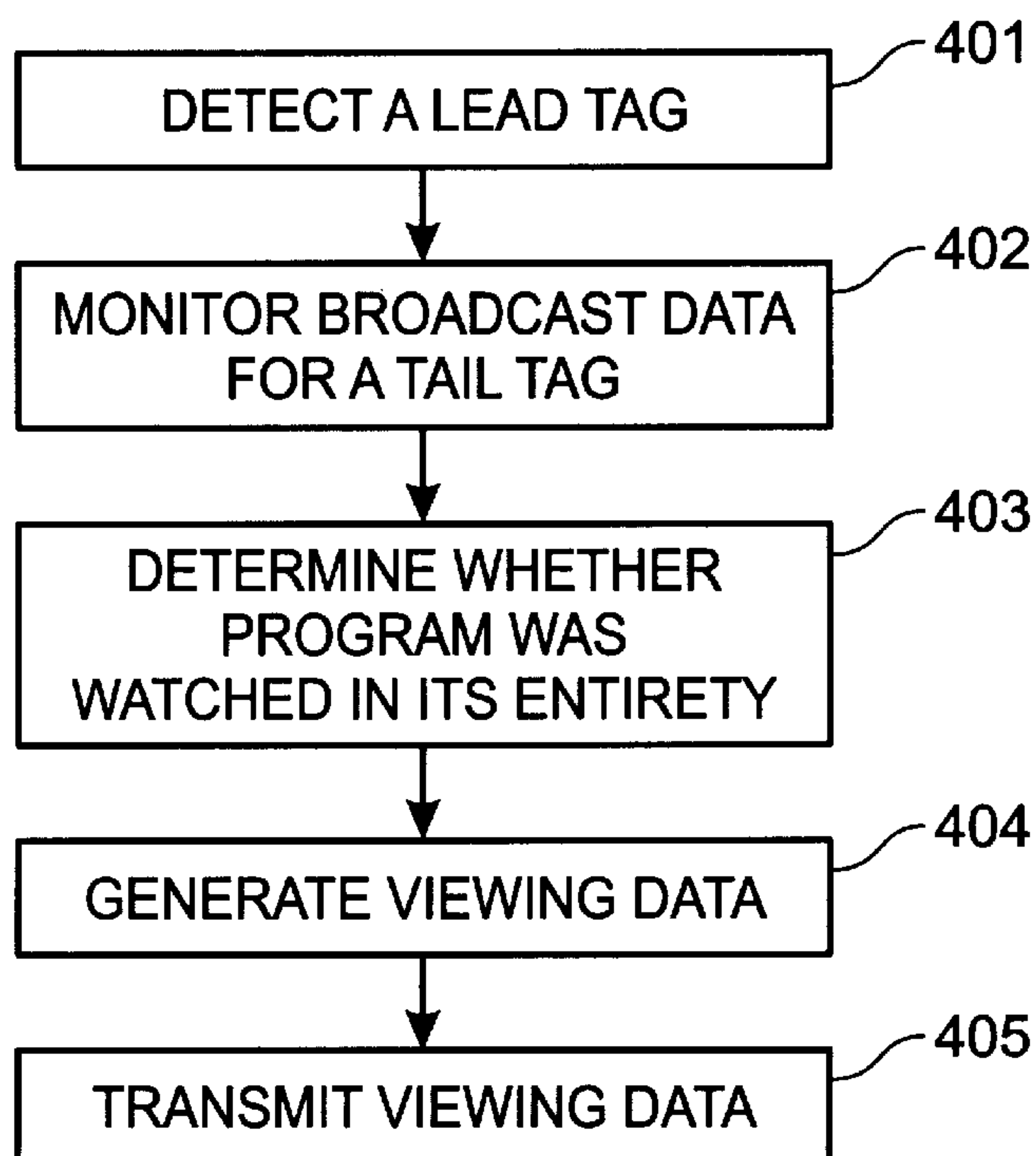


Fig. 4





## METHOD AND APPARATUS FOR MONITORING VIEWING OF BROADCAST DATA

### FIELD OF THE INVENTION

The present invention relates to the field of entertainment systems. More specifically, the present invention relates to a method and apparatus for monitoring the viewing of broadcast data on an entertainment system.

### BACKGROUND OF THE INVENTION

Television has become the key element in the advertising program for many companies. Billions of dollars are invested in communicating a product message to the viewing audience. Advertisers who spend such huge sums of money understandably want to determine whether their money is being well spent and, if not, how improvements can be made. Feedback to assess whether an advertising campaign is working is desired. Information such as was a targeted portion of the public exposed to the campaign as planned and did the public find the advertisement favorable is valuable to the advertisers.

Various techniques are currently available to provide information of this nature. However, each of these suffers from various drawbacks. One of the earliest techniques involved conducting interviews with television viewers to determine their exposure to a particular advertisement and whether they had a favorable impression of the advertisement. This approach, however, required finding television viewers willing to participate in sometimes long surveys at inconvenient times. In addition, results obtained with this technique were suspect because of the heavy reliance on memory, and on the viewer's inclination to be biased in favor of what is of interest to the interviewer. Current audience measurement systems eliminate the need for participating in surveys at inconvenient times and the element of bias, but require participating households to have their television sets and video playback devices to be disassembled and hard-wired with viewing monitoring circuitry.

### SUMMARY

A method for monitoring viewing of broadcast data according to an embodiment of the present invention is disclosed. A lead tag corresponding to a program in the broadcast data is detected. The broadcast data is monitored for a tail tag corresponding to the program. Whether the program was viewed in its entirety is determined by matching the lead tag with the tail tag.

### BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example and not by way of limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

FIG. 1 is a block diagram illustrating the system components of one embodiment of an entertainment system according to the present invention;

FIG. 2 is a block diagram illustrating one embodiment of a system controller according to the present invention;

FIG. 3 is a block diagram of modules implementing an embodiment of the present invention; and

FIG. 4 is a flow chart illustrating a method for monitoring viewing of broadcast data according to an embodiment of the present invention.

### DETAILED DESCRIPTION

FIG. 1 is a block diagram illustrating system components of an entertainment system **100** according to one embodiment of the present invention. The entertainment system includes a common input/output (I/O) bus **110** that connects the system components in the entertainment system **100** together. It should be appreciated that the common I/O bus **110** is illustrated to simplify the routing of signals between the computer system components. The common I/O bus **110** may represent a plurality of known mechanisms and techniques for routing I/O signals between the computer system components. For example, the common I/O bus **110** may include an appropriate number of independent audio "patch" cables that route audio signals, coaxial cables that route video signals, two-wire serial lines or infrared or radio frequency transceivers that route control signals, or other routing mechanisms that rout other signals.

In the illustrated embodiment, the entertainment system **100** includes a television/monitor **121**, video recorder/playback device **122**, digital video disk (DVD) recorder/playback device **123**, audio/video tuner and amplifier **124**, audio playback/recorder device **125**, and compact disk player **126** coupled to the common I/O bus. The video recorder/playback device **122**, DVD recorder/playback device **123**, audio playback/recorder device **125**, and compact disk player **126** may be single disk or single cassette devices, or alternatively may be multiple disk or multiple cassette devices.

In addition, the entertainment system **100** includes a speaker system **131**, microphone **132**, video camera **133**, and a wireless I/O control device **134**. In one embodiment, wireless I/O control device **134** is an entertainment system remote control unit which communicates with the components of the entertainment system **100** through IR signals. In another embodiment, wireless I/O control device **134** may be a wireless keyboard and cursor positioning device that communicates with the components of entertainment system **100** through IR signals or RF signals. In yet another embodiment, wireless I/O control device **134** may be an IR remote control device similar in appearance to a typical entertainment system remote control with the added feature of a track-ball or other navigational mechanisms which allows a user to position a cursor on a display of the entertainment system **100**.

The entertainment system **100** also includes a system controller **140**. According to one embodiment of the present invention, the system controller **140** operates to monitor the viewing of broadcast data on a television/monitor **121** on the entertainment system **100**. The system controller **140** generates viewing data that may include the name of the program viewed and whether the program was viewed in its entirety. A program may be defined as a television program or a television commercial. According to another embodiment of the present invention, system controller **140** is configured to control a wide variety of features associated with each of the system components. As shown in FIG. 1, system controller **140** is coupled, either directly or indirectly, to each of the system components, as necessary, through I/O bus **110**. In one embodiment, in addition to or in place of I/O bus **110**, system controller **140** is configured with a wireless communication transmitter (or transceiver), which is capable of communicating with the system components via IR signals or RF signals **110'**. Regardless of the control medium, the system controller **140** is configured to control one or more of the entertainment system components of the entertainment system **100**, although it is understood



that each of the components may be individually controlled with wireless I/O control device **134**.

As illustrated in FIG. 1, system **100** may be configured to receive broadcast data from a wide variety of entertainment system data sources. In one embodiment, entertainment system **100** receives broadcast data from any or all of the following sources: cable broadcast **141**, satellite broadcast **142** (e.g., via a satellite dish), very high frequency (VHF) or ultra high frequency (UHF) radio frequency communication of the broadcast networks **143** (e.g., via an aerial antenna), or other broadcast data sources. Further, it will be appreciated by one skilled in the art, that cable broadcast input **141**, satellite broadcast input **142** and VHF/UHF input **143** may receive input from digital broadcast programming and digital cable programming. The broadcast data may be received by the entertainment system **100** via the audio/video tuner and amplifier **124**, the system controller **140**, or other system components or combination of system components.

Although the present invention is described in the context of the exemplary embodiments presented in the figures, those skilled in the art will appreciate that the present invention is not limited to these embodiments and may be practiced in a variety of alternate embodiments. Accordingly, the innovative features of the present invention may be practiced in a system of greater or lesser complexity than that of the system depicted in FIG. 1.

FIG. 2 is a block diagram illustrating an embodiment of a computer system **200** that may be used to implement the system controller **140** according to the present invention. The computer system **200** includes a processor **201** that processes data signals. The processor **201** may be a complex instruction set computer (CISC) microprocessor, a reduced instruction set computing (RISC) microprocessor, a very long instruction work (VLIW) microprocessor, a processor implementing a combination of instruction sets, or other processor device. FIG. 2 shows an example of the present invention implemented on a single processor computer system **200**. However, it is understood that the present invention may be implemented in a computer system having multiple processors. The processor **201** is coupled to a CPU bus **210** which transmits data signals between processor **201** and other components in the computer system **200**.

As an example, memory **213** may be a dynamic random access memory (DRAM) device, a static random access memory (SRAM) device, or other memory device. The memory **213** stores data signals that are executed by the processor **201**.

A bridge memory controller **211** is coupled to the CPU bus **210** and the memory **213**. The bridge memory controller **211** directs data signals between the processor **201**, the memory **213**, and other components in the computer system **200** and bridges the data signals from these components to a first I/O bus **220**.

The first I/O bus **220** may be a single bus or a combination of multiple buses. As an example, the first I/O bus **220** maybe a high performance I/O bus that operates at high throughput rates. The first I/O bus **220** may include for example a Peripheral Components Interconnect (PCI) bus, a Personal Computer Memory Card International Association (PCMCIA) bus, a NuBus, or other buses. The first I/O bus **220** provides communication links between components in the computer system **200**. A network controller **221** links the computer system **200** to a network of computers and supports communication among the machines. A display device controller **222** is coupled to the first I/O bus **220**. The display device controller **222** allows coupling of a display device to

the computer system **200** and acts as an interface between the display device and the computer system **200**. The display device controller may be a monochrome display adapter (MDA) card, a color graphics adapter (CGA) card, an enhanced graphics adapter (EGA) card, an extended graphics array (XGA) card, a video card that includes a video tuner and amplifier, or other display device controller. The display device may be a television set, a computer monitor, a flat panel display or other display device. The display device receives data signals from the processor **201** through the display device controller **222** and displays the information and data signals to the user of the computer system **200**.

A second I/O bus **230** may be a single bus or a combination of multiple buses. The second I/O bus **230** may include an Industry Standard Architecture (ISA) bus, an Extended Industry Standard Architecture (EISA) bus, or other buses. The second I/O bus **230** provides communication links between components in the computer system **200**. A keyboard interface **232** may be a keyboard controller or other keyboard interface. The keyboard interface **232** may be a dedicated device or can reside in another device such as a bus controller or other controller. The keyboard interface **232** allows coupling of a keyboard to the computer system **200** and transmits data signals from a keyboard to the computer system **200**. A data storage device **231** may be a hard disk drive, a floppy disk drive, a CD-ROM device, a flash memory device or other mass storage device. An audio controller **233** operates to coordinate the recording and playing of sounds is also coupled to the I/O bus **230**. A wireless communications interface **234** may be an IR transceiver or a RF transceiver for transmitting and receiving signals between system components of the entertainment system **100** (shown in FIG. 1).

A bus bridge **223** couples the first I/O bus **220** to the second I/O bus **230**. The bus bridge **223** operates to buffer and bridge data signals between the first I/O bus **220** and the second I/O bus **230**.

According to one embodiment, monitoring viewing of broadcast data is performed by the computer system **200** in response to the processor **201** executing sequences of instructions contained in the memory **213**. Such instructions may be read into the memory **213** from other computer-readable mediums such as data storage device **231** or from a computer connected to the network via the network controller **211**. Execution of the sequences of instructions contained in the memory **213** causes the processor to monitor viewing of broadcast data, as will be described hereafter. In alternative embodiments, hard-wire circuitry may be used in place of or in combination with software instructions to implement the present invention. Thus, the present invention is not limited to any specific combination of hardware circuitry and software.

FIG. 3 is a block diagram illustrating an embodiment of modules of a broadcast data monitor **300**, according to the present invention. The modules may be implemented by software, hardware, or a combination of both hardware and software. The broadcast data monitor **300** includes a broadcast data receiver interface **310**. The broadcast data receiver interface **310** operates to connect the broadcast data monitor **300** to a broadcast data receiver and to access broadcast data from a plurality of sources including analog and digital broadcast data such as cable broadcast input, satellite broadcast input, and VHF/UHF input. The broadcast data receiver interface **310** thus receives the broadcast data that is being viewed by the user of the entertainment system **100** (shown in FIG. 1). The broadcast data receiver interface **310** may be coupled directly or indirectly to the audio/video tuner and



amplifier **124** (shown in FIG. **1**), a display device controller **222** that includes a video card with a tuner and amplifier (shown in FIG. **2**), or other circuitry to receive broadcast data.

A broadcast data analyzer **340** is coupled to the broadcast data receiver **310** and receives the broadcast data from the broadcast data receiver **310**. According to an embodiment of the present invention, the broadcast data analyzer **340** monitors the broadcast data for program identification tags in the broadcast data. According to one embodiment of the present invention, a program identification tag is a message encoded in the vertical blanking interval (VBI) of analog broadcast data. According to a second embodiment of the present invention, a program identification tag is a message encoded in a program in digital broadcast data. The encoded message may be graphical, text, or other format and may include a name of a program, a code that corresponds to a name of a program, or other information corresponding to the program. The broadcast data analyzer **340** may include a VBI analyzer and a digital broadcast analyzer to monitor the broadcast data for the program identification tags.

More than one program identification tag may be encoded in a program. For example, a "lead tag" may be encoded in the beginning of a program that identifies the beginning of a program and a "tail tag" may be encoded at the end of a program to identify the end of a program. Upon detecting a lead tag and a matching tail tag of a first program without detecting a tag that corresponds to a second program in between the lead tag and tail tag of the first program, the broadcast data analyzer **340** recognizes that a user of the entertainment system **100** has viewed the first program in its entirety. Upon detecting a lead tag of a first program and a tag corresponding to a second program after the lead tag of the first program, the broadcast data analyzer **340** recognizes that a user of the entertainment system **100** viewed the beginning of the first program, but did not view the end of the first program. In an embodiment of the present invention where "intermediate" program identification tags are encoded between a lead tag and a tail tag throughout a program, the broadcast data analyzer **340** would be able to determine the segment of the program where the user of the entertainment system **100** stopped viewing the program to the increment of time where the intermediate tags are encoded. Information regarding whether a program identification tag is lead tag, a tail tag, or an intermediate tag, and whether the program identification tag corresponds to a first program or a second program may be obtained by the broadcast data analyzer **340** at the program reference unit **350**. According to an alternate embodiment of the present invention, the tags are self-identifying.

According to an embodiment of the present invention, the broadcast data analyzer **340** also monitors the audio signal as adjusted by the user of the entertainment system and recognizes when volume in a program has been adjusted. For example, the broadcast data analyzer **340** recognizes when volume in a program has been lowered, muted, or increased.

A program reference unit **350** is coupled to the broadcast data analyzer **340**. The program reference unit **350** includes a program identification unit **351** and a source/time identification unit **352**. The program identification unit **351** includes a table of codes that may be found to be encoded in the VBI of a program in analog broadcast data or in a program in digital broadcast data. Each of the codes has a corresponding program name and may include information as to whether the code corresponds to a lead tag, a tail tag, or an intermediate tag. The source/time identification unit

**352** identifies the time and date broadcast data is viewed and a broadcast data source (channel) of the broadcast data. The program reference unit **350** receives the program identification tags detected by the broadcast data analyzer **340** and generates viewing data based on the program identification tags received. According to an embodiment of the present invention, the viewing data may include a name of the program that was viewed and whether the program was viewed in its entirety. The viewing data may also include information relating to whether the volume level of the program was adjusted during its viewing, the time the program was viewed, the broadcast data source of the program, and when during the program did the user of the entertainment system stop viewing the program if the program was not viewed in its entirety.

A log **330** is coupled to the program reference unit **350**. The log **330** operates to store viewing data generated by the program reference unit **350**. According to an embodiment of the present invention, the log **330** also operates to store user data relating to the user of the entertainment system **100**. The user data may include personal data such as the age, sex, location, income, interests and other information about the user. The user data may also include viewing preferences of the user.

An external interface **320** is coupled to the log **330**. The external interface operates to transmit the viewing data and the user data to a remote computer system. According to an embodiment of the present invention, the external interface **320** may transmit the viewing data and the user data through a network via the network controller **221** or other communication medium. According to an embodiment of the present invention, the viewing data and the user data from a plurality of entertainment systems may be transmitted to the remote computer system where the information is processed and a report is generated that includes data describing the number of viewers that watch a television program or a television commercial, whether the viewers watched the entire program, and demographics about the viewers.

It should be appreciated that the broadcast data receiver interface **310**, the external interface **320**, the log **330**, the broadcast data analyzer **340**, the program reference unit **350**, the program identification unit **351**, and the source/time identification unit **352** may be implemented by any known circuitry or technique. It should be appreciated that FIG. **3** illustrates one embodiment of the components in the broadcast data monitor **300** and that the components may be coupled in other arrangements.

According to an alternate embodiment of the present invention, the program identification unit **351** is a database that includes the name of programs that are broadcasted from various broadcast data sources at various times and dates. The program reference unit **350** may use the program identification unit **351** to determine a name of a program that a viewer is viewing on the entertainment system **100** by referencing information in the program identification unit **351** with information in the source/time identification unit **352** regarding a time that a viewer is viewing broadcast data and a broadcast data source from where the broadcast data is transmitted from. The program reference unit **350** may also determine whether a program is viewed in its entirety. According to this embodiment of the present invention, the program identification unit **351** may generate viewing data without utilizing program identification tags received from the broadcast data analyzer **340**. The viewing data may include a name of a program that was viewed, whether the program the program was viewed in its entirety, whether the volume of the program was adjusted, and the time and broadcast data source of the program.



FIG. 4 is a flow chart illustrating a method for monitoring viewing of broadcast data. According to an embodiment of the present invention, monitoring is performed in a system local to where the broadcast data is viewed. At step 401, a lead tag corresponding to a program in the broadcast data is detected. According to an embodiment of the present invention, the lead tag is a program identification tag that is encoded in the VBI in the program in the broadcast data. According to a second embodiment of the present invention, the lead tag is a program identification tag that is encoded in the program in the broadcast data.

At step 402, the broadcast data is monitored for a tail tag that corresponds to the program. According to a first embodiment of the present invention, the lead tag and the tail tag are identical. According to a second embodiment of the present invention, the lead tag and the tail tag are not identical and a tail tag is recognized by referencing information in a program reference unit.

At step 403, whether the program was viewed in its entirety is determined. According to an embodiment of the present invention, this is achieved by matching the lead tag of the program with a tail tag of the program without detecting a program identification tag corresponding to another program.

At step 404, viewing data relating to the viewing of the program is generated. According to an embodiment of the present invention, the viewing data may include the name of the program, whether the program was viewed in its entirety, the time when the program was viewed, the broadcast data source of the program, and whether the volume of the program was lowered. According to one embodiment of the present invention, the name of the program is obtained by matching the program identification tag of the program with information in a program identification unit. According to a second embodiment of the present invention, the time the program was viewed and the broadcast data source of the program is obtained from a source/time identification unit.

At step 405, the viewing data is transmitted to a remote computer system. The viewing data may be transmitted over the Internet, over a direct phone connection, or other communication medium.

In the foregoing specification, the invention has been described with references to specific embodiments thereof. It will however be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention. The specification and drawings are, accordingly, to be regarded in an illustrative rather than restrictive sense.

What is claimed is:

1. A method for monitoring viewing of broadcast data, comprising:

- detecting a lead tag corresponding to a program in the broadcast data;
- monitoring the broadcast data for a tail tag corresponding to the program;
- determining whether the program was viewed in its entirety by matching the lead tag with the tail tag; and
- generating viewing data relating to the viewing of the program;
- wherein generating viewing data relating to the viewing of the program comprises recording whether volume of the program was adjusted.

2. The method of claim 1, wherein detecting the lead tag of the program in the broadcast data comprises reading a message encoded in the program.

3. The method of claim 1, wherein detecting the lead tag of the program in the broadcast data comprises reading a message encoded in a vertical blanking interval (VBI) of the broadcast data.

4. The method of claim 1, wherein generating viewing data relating to the viewing of the program comprises recording a name of the program.

5. The method of claim 1, wherein generating viewing data relating to the viewing of the program comprises recording whether the program was viewed in its entirety.

6. The method of claim 1, wherein generating viewing data relating to the viewing of the program comprises recording a time when the program was viewed.

7. The method of claim 1, wherein generating viewing data corresponding to the viewing of the program comprises recording a broadcast data source of the program;

recording a name of the program;

recording whether the program was viewed in its entirety; and

recording a time when the program was viewed.

8. The method of claim 1, further comprising transmitting the viewing data to a remote computer system.

9. A computer-readable medium having stored thereon sequences of instructions, the sequences of instructions including instructions which, when executed by a processor, causes the processor to perform the steps of:

analyzing broadcast data to monitor said broadcast data for program identification tags corresponding to programs in the broadcast data;

generating, based on the analyzing, program viewing data that includes a name of a first program in the broadcast data and information regarding whether the first program was viewed in its entirety based on the program identification tags; and

recording in a log the program viewing data from the generating.

10. The computer-readable medium of claim 9, wherein detecting the program identification tags in the broadcast data comprises reading a message signature encoded in the program.

11. The computer-readable medium of claim 9, wherein detecting the program identification tags in the broadcast data comprises reading a message encoded in a vertical blanking interval (VBI) of the broadcast data.

12. The computer-readable medium of claim 9, wherein generating viewing data relating to the viewing of the program comprises recording a name of the program.

13. The computer-readable medium of claim 9, wherein generating viewing data relating to the viewing of the program comprises recording whether the program was viewed in its entirety.

14. The computer-readable medium of claim 9, further comprising instructions which when executed by the processor causes the processor to perform the step of transmitting the viewing data to a remote computer system.

15. A broadcast data monitor, comprising:

a broadcast data analyzer that monitors broadcast data for program identification tags corresponding to programs in the broadcast data; and

a program reference unit, coupled to the broadcast data analyzer, that generates a log of program viewing data that includes a name of a first program in the broadcast data and information regarding whether the first program was viewed in its entirety based on the program identification tags.

wherein generating viewing data relating to the viewing of the program comprises recording whether volume of the program was adjusted.



**9****16.** A broadcast data monitor, comprising:

a broadcast data analyzer that monitors broadcast data for program identification tags corresponding to programs in the broadcast data;

a program reference unit, coupled to the broadcast data analyzer, that generates program viewing data that includes a name of a first program in the broadcast data and information regarding whether the first program was viewed in its entirety based on the program identification tags; and

a log, coupled to the program reference unit, that records the program viewing data generated by the program reference unit.

**17.** The broadcast data monitor of claim **16**, further comprising an external interface, coupled to the log, that transmits the program viewing data to a remote computer system.

**10****18.** A broadcast data monitor, comprising:

a broadcast data analyzer that monitors broadcast data for program identification tags corresponding to programs in the broadcast data; and

a program reference unit, coupled to the broadcast data analyzer, that generates program viewing data that includes a name of a first program in the broadcast data and information regarding whether the first program was viewed in its entirety based on the program identification tags;

wherein the program reference unit comprises

a program identification unit that stores names of programs and identification tags corresponding to the programs, and

a source/time reference unit that indicates the time when the first program was viewed and the broadcast data source of the first program.

\* \* \* \* \*